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On the cover: Standing (left to right): Dr. Julie C. Jones, Lindsay Hardy, Katherine Magouirk, Dr. Jacqueline A. Jensen. Kneeling (left to right): Angela Brown, Barbara Sexton, Christy Sue Crouch. Article begins on page 6. (Photograph by Jennifer McLoud-Mann)

FOCUS Deadlines			
	January	February	March
Editorial Copy	November 14	December 15	January 18
Display Ads	November 26	December 21	January 29
Employment Ads	November 12	December 10	January 15

2004 Haimo Award Winners to Give Presentations on the Secrets of Their Teaching Success

The three winners of this year's Deborah and Franklin Tepper Haimo Awards — Andrew Liu, Olympia Nicodemi, and Tom Garrity — will be featured speakers at the Joint Mathematics Meeting, in Phoenix, Arizona. The national meetings will run from January 7-10. The three teaching award recipients will give their presentations on Friday, January 9, from 2:30-4:00 p.m. All attendees are welcome.

Andrew C.F. Liu

Andrew Chiang-Fung Liu (University of Alberta), a popular speaker in schools, has organized math fairs and directed summer math camps. As a teacher, he is known for his ability to make mathematics fun and for his uncanny sense for good problems. A devoted supporter of mathematics competitions, he has served as coach and leader for the Putnam and IMO teams, chaired the Problem Selection Committee of the IMO, and served as vice-president of the International Mathematics Tournament of the Towns. He has received two teaching awards from his own University of Alberta, two Canadian national teaching awards, a 3M Teaching Fellowship, and the David Hilbert International Award for promotion of mathematics learning from the World Federation of Mathematics Competitions. In Phoenix, he will share his ideas on teaching, problem solving, and interesting student solutions. His talk is tentatively titled *A S.N.A.P. Math Fair*.

Olympia Nicodemi (SUNY College at Geneseo) has been a role model among teachers. One of her colleagues says that for Olympia mentoring students is a way of life. Her excellent teaching is marked by her ability to provide extra help for struggling students, to encourage students whose mathematical abilities are budding, and to stimulate more advanced students to take on difficult challenges. She has directed many undergraduate research projects and honors theses and has been a guiding force in the "Research Weekend Experience" program at Geneseo. She has received the SUNY Chancellor's Award for Excellence in

Olympia Nicodemi

Teaching and the Elena Lucrezia Cornaro Award for significant contributions to her profession and community. Olympia has also been active with the MAA: she has been a Project NeXT mentor, and has served as faculty advisor to Geneseo's student MAA chapter for more than a decade. Her success has led to her current position as Student Chapter Coordinator for the Seaway Section.

Thomas Garrity (Williams College) is one of those teachers that students rarely forget: his approach to teaching ranges from teaching a class while hopping on one foot to teaching without saying a word. He is completely uninhibited. Approaching a key point, he has been known to raise his voice dramatically, and say "and now I am raising my voice dramatically to create an artificial

Thomas Garrity

sense of excitement as we reach the key point." The result is that his students recall not just the antics but the subject matter. More importantly, he has been able to take math-phobic and math-talented students and turn them into mathematicians.

Tom's far-reaching mathematical interests make him an exceptional research advisor. He often has three thesis students working in three different areas, generally linked to his own research. He

has been instrumental in the Williams "SMALL" summer REU which has produced more publications than any other in the country; he alone has advised 37 summer research students. Tom is also the author of *All the Mathematics You Missed (But Need to Know for Graduate School)*, a successful book which was reviewed on MAA Online not too long ago. His talk at the Joint Meetings, entitled *Functions of the World*, is bound to be memorable. ■

Mark Your Calendar!
Haimo Award Winners' Talks
Friday, January 9, 2004
2:30-4:00

About the Haimo Awards

In 1991, the MAA created the Awards for Distinguished College or University Teaching of Mathematics in order to honor college or university teachers who have been widely recognized as extraordinarily successful and whose teaching effectiveness has been shown to have had influence beyond their own institutions. In 1993 the MAA Board of Governors renamed the award to honor Deborah and Franklin Tepper Haimo. Each year at most three college or university teachers are honored with this national award. Most MAA sections give an annual teaching award, and winners of these sectional awards are automatically considered nominees for the Haimo Award. Most winners are chosen from among these (from either the current or the previous year), but the committee will also consider direct nominations from MAA members. For more information on the award, past winners, and nomination instructions, visit http://www.maa.org/awards/haimo.html.

2004 AAAS Meeting to Offer Strong Mathematics Program

By Warren Page

The 2004 Annual Meeting of the American Association for the Advancement of Science, February 12–16, in Seattle, WA, will feature many outstanding expository talks by prominent mathematicians. These include the following three-hour symposia (and organizers) sponsored by Section A (Mathematics) of the AAAS:

The Convergence of Computer Graphics and Computer Vision (P. Anandan and Jim Kajiya, Microsoft Research)

Optimal Stent Design for Cardiovascular Intervention (Suncica Canic, University of Houston)

Phase Transitions in Computer Science (Allon Percus, Institute for Pure and Applied Mathematics)

The Changing Nature of Proof in Mathematics: Past, Present, Future (Warren Page, City University of New York)

Community Structure of the Internet and WWW (Jennifer Tour Chayes, Microsoft Research)

Other symposia that will be of interest to the mathematical community include:

The Rise of Machine Learning

What Progress Have We Made in Integrating Technology into Teaching and Learning?

Wavelet-Based Statistical Analysis of Multiscale Geophysical Data

Forum for School Science: Preparation of Science and Mathematics Teachers

Bioterrorism Policy and Quantitative Methods

Modeling and Risk Assessment

21st Century Photonics

Intellectual Property and the Research Exemption: Its Impact on Science

The above symposia are only a few of the 150 or so AAAS program offerings in the physical, life, social, and biological sciences. For further details about the 2004 AAAS program, see the October 17th, 2003 issue of *Science*.

AAAS annual meetings are the showcases of American science, and they encourage participation by mathematicians and mathematics educators. (AAAS acknowledges the generous contributions of AMS for travel support and SIAM for support of media awareness.) In presenting mathematics-related themes to the AAAS Program Committee, I have found the committee to be genuinely interested in offering symposia on mathematical topics of current interest. Thus, Section A's Committee seeks organizers and speakers who can present substantial new material in an accessible manner to a large scientific audience. Toward this end, I invite you to attend our Section A Committee business meeting 7:45–10:45 p.m. Friday, February 13th, 2004, at the Sheraton Seattle Hotel (room to be determined). I invite you also to send me, and encourage your colleagues to send me, symposia proposals for future AAAS annual meetings. ■

Warren Page (wxpny@aol.com) *is Secretary of Section A of the AAAS*

MAA Invited Paper Sessions at the Phoenix Joint Meetings

WeBWorK, a Web-Based Homework System, Thursday afternoon, organized by **Michael G. Gage, Arnold K. Pizer,** and **Vicki Roth**, University of Rochester; **Jeffrey W. Holt**, University of Virginia; and **John W. Jones**, Arizona State University. Further information on WebWork may be found at http://webwork.rochester.edu.

Assessment of Student Learning in Undergraduate Mathematics, Friday afternoon, organized by **Bernard L. Madison**, University of Arkansas at Fayetteville, and **William E. Haver**, Virginia Commonwealth University.

The Use of Hand-Held Technology in College and University Developmental Algebra Classrooms, Friday afternoon, organized by **Wade Ellis Jr.**, West Valley College, and **Edward D. Laughbaum**, The Ohio State University.

Applications of Topology to Biology, Chemistry, and Physics, Saturday afternoon, organized by **Erica L. Flapan**, Pomona College, and **Dorothy Buck**, Brown University. ■

These were inadvertently left out of the October FOCUS Meetings issue.

Undergraduate Student Poster Session at the Phoenix Joint Meetings

The Undergraduate Student Poster Session will take place on January 9, 2004 in Phoenix, AZ, in conjunction with the Annual Meeting of the Mathematical Association of America (MAA) and the American Mathematical Society (AMS).

The poster session will be organized by Mario Martelli of Claremont McKenna College. It is sponsored by the Committee on Undergraduate Student Activities (CUSAC) of the MAA. Interested participants should send a title and a (no more than) one half-page abstract either by regular mail to Mario Martelli, Mathematics Department, Claremont McKenna College, 850 Columbia Ave., Claremont, CA 91711, or by email to mario.martelli@claremontmckenna.edu. The deadline is December 9, 2003.

Please list the name of the author(s) and indicate the presenter(s). Include address, phone number and e-mail of one presenter who will coordinate your participation with the organizer. List the address and the name of the faculty advisor(s), and, when applicable, any source of financial support you may have received for the research on which the poster is based. The coordinating pre-

senter will be notified of the acceptance no later than two weeks after the above information has been received. Expositors are strongly encouraged to apply early since the space is limited and it will be assigned on a first come, first serve basis.

The session is reserved for undergraduates, but first year graduate students can submit posters on work done while they were undergraduates. As the title of the session suggests, the content of each poster cannot be purely expository. Typical contents may be either a new result, or an interesting proof of an existing theorem, or an unpublished solution to a problem that appeared in one of the MAA journals.

Each poster will be judged by three experts on the basis of mathematical originality and content, inventiveness and clarity of presentation, and appropriateness of answers given by the presenters to questions posed by the judges. Monetary prizes will be awarded to the best posters with funds provided by MAA, AMS, AWM, and CUR.

Abstracts of the posters will not be published in the printed program of the meeting. However, the organizer will prepare a handout listing all exhibitors together with contact information (e-mail, phone, address), a title of their poster, a short abstract, and the name of the faculty under whose supervision the work was done. Presenters may wish to bring 25-50 copies of more detailed accounts to hand out to interested visitors. They may also wish to bring blank stick-on mailing labels for those visitors who want to receive a final copy of the work presented in the poster.

The organizer cannot provide any financial support for the students presenting the posters. Self-standing table-top posters which are 48 inches wide, 36 inches high and are tri-fold, and "Spray Mount" will be available. Additional materials for setting up the posters, as well as computers and/or other technological devices needed for the presentation, are the responsibility of each presenter. Please notify the organizer at your earliest convenience if you expect to need outlet power for your presentation. The room will be open for setting up the posters at 3:00 pm on Friday. We hope to see many undergraduates in Phoenix! ■

Mathematics for Business Decisions at the Joint Mathematics Meetings in Phoenix

Organized by Richard Thompson and Christopher Lamoureux, University of Arizona
Friday, 9:00 a.m. to 11:00 a.m., 1:00 p.m. to 3:00 p.m., 5:00 p.m. to 7:00 p.m.

After five years of development, and testing by thousands of students, the Mathematical Association of America is publishing the electronic texts *Mathematics for Business Decisions*, Parts 1 and 2. Jointly written by a mathematician and a professor of finance, these e-texts feature four interdisciplinary, multimedia projects for lower division students in business and

public administration. The projects involve: Loan Work Outs, Stock Option Pricing, Marketing Computer Drives, and Bidding on an Oil Lease. The two course sequence, including probability, simulation, calculus, and optimization, is designed to replace the traditional combination of finite mathematics and brief calculus. We will demonstrate the new materials, discuss the challenges and

rewards of teaching the program, and allow plenty of time for hands-on computer experimentation with the texts. Participants will receive a Guided Tour CD with video and narrated interactive PowerPoint demonstrations. Examination copies of both e-texts will also be provided. Registration is free! ■

Starting an Undergraduate Research Program

By Julie C. Jones and Jacqueline A. Jensen

Shortly after we started working at Sam Houston State University in the fall of 2002, we learned that SHSU would be hosting the annual Texas section meeting of the MAA in the spring of 2003. We also learned that there were no SHSU students planning to give talks. This fact disturbed us. So we decided that we should try to find students who would be willing to give talks.

We attended a few math club meetings, asking for volunteers. We hoped to get two or three willing participants, but instead we got nine. Here we were, first-year faculty members with nine students to advise and not a clue as to how to proceed. Of these nine students, four were sophomores. While we were thrilled that so many undergraduates were interested, this presented another challenge. Advising students with such little mathematical background is difficult, but we were, and still are, confident that getting them involved in the mathematical community is the right thing to do.

At this point, math history became our best friend. Our four sophomores talked about "Three Hundred Fifty Years of Proving Fermat's Last Theorem," "Fractals Based on Pascal's Triangle," "Heron's Formula and His Proof," and "Martha Euphemia Lofton Haynes: the First African American Female Mathematician." None of these topics require much mathematical maturity, but they are interesting and appropriate for student presentations. Furthermore, they provided an opportunity for our students to learn about people like them, including women and minorities, who are often omitted from the history of mathematics.

Two of our more senior students had just completed their first abstract algebra course and were intrigued with some of the ideas presented in that course. One of these students became interested in cryptography and gave an expository talk on RSA cryptography. Her newly-found self-confidence, gained from her research and presentation experience, has encour-

aged her to explore graduate programs where she can study cryptography. Another student decided to combine her interest in abstract algebra with her minor program in the physical sciences to investigate the symmetry groups of molecular and crystallographic structures.

Each of the students picked topics that were most interesting to them. Because of this, we were sometimes advising students who knew substantially more about the topic than we did. Even topics that initially seemed uninspired were shaped by the students' enthusiasm into presentations that were informative for us, as well as for their peers. In this way, we learned as much as the students.

In the months before the Texas section meeting, we had many meetings during which the students practiced their talks. We encouraged the students to critique their peers' talks, but we made sure that this was done in a constructive and respectful manner. We also learned that often what we say is not nearly as important as how we say it. For example, if the conclusion of a student's talk needs improvement, it is not constructive to say, "You conclusion stinks." It is more useful to say something like, "Your talk was really good, but I think that we need to work on that ending," and give suggestions for improving it. It is also important to find some good things in a student's talk, even if the talk is largely a "crash and burn."

It took a couple of these "crash and burn" talks for us to remember that our students had never seen math talks. We, therefore, offer the following advice to people starting similar programs at their schools:

1) Students who have never seen talks don't know not to say things like "Sierpinski was a Polish dude" or "That guy was a little wacko." Having your students practice their talks in front of their peers will help this; students realize that they need to be more formal when their peers

get the giggles. It takes some practice for them to realize that they are presenting information, not talking to their friends.

2) Most students have never made slides to accompany their talks, and they do not have any idea how much information to put on their slides. Again, practice helps, as does a large budget with which to buy transparencies. We now encourage our students to practice with paper versions of their slides. We copy their work onto transparencies only after they have worked out all of the kinks.

3) Students will be very nervous, even in front of their peers. The environment of the practice talks needs to remain supportive, and any non-supportive behavior needs to be stopped immediately. All comments and criticisms should be welcome, as long as they are offered in a supportive manner.

4) Some students will have minor (or major) difficulties at some point in the process. Remind them that they know more about their topic than anyone else in the room and that they should be confident in their abilities.

5) Some students tend to procrastinate. We know that this is an obvious point, but don't let students who put off the preparation of their talk or the making of their slides make you too nervous. Usually they will come through, sometimes making a far better presentation than you expect.

While we wanted our students to all give great talks, the most important part was that they did their personal best. They did not let us down! Our students put a great deal of effort into their talks, and they made their talks their own. Their efforts were rewarded, as two students won the award for best paper in their sessions at the Texas section MAA meeting.

Attending the Texas section meeting was an incredible experience that truly changed our students. We have seen a

dramatic increase in their self-esteem. When they talk about mathematics, they are confident about their abilities. They were always talented, but it took something like presenting a paper at a meeting for them to realize it. It has also produced an enormous change in our department. The students held the First Annual SHSU Geek Week in April, 2003, which was an opportunity for the mathematics and statistics majors to flaunt their "geekiness." This is the beginning of a tradition that will continue to be sponsored by the math club and the SHSU Student Chapter of the MAA. Their excitement has been transferred to many other students in the department and several more students have indicated an interest in presenting papers at the next Texas section meeting of the MAA.

Attending the Texas section meeting also broadened their horizons. Most of our math majors are from rural parts of east Texas. Until the Texas section meeting,

most of them planned to go back to their hometowns and teach at the high school level after they finished college. They did not know what other options they have. Now, they are all talking about graduate school! We are not trying to stop anybody from teaching high school, but we want them to make informed decisions.

Sometime after the section meeting, we mentioned MathFest to them. Five of the students, all women, including two of the sophomores, decided that they wanted to attend this annual meeting the MAA in Boulder, Colorado. Of course, we supported this. Some of the students recycled their talks from the Texas section meeting, but others undertook new topics. One student even ventured into the uncharted territory of undergraduate research. Again, the students did not disappoint us! They all did a great job, and one student won the award for best paper in her session.

Before going to MathFest, the students decided that they needed matching t-shirts. They decided on a design that had Steven Wright's saying "A black hole is where God divided by zero" on the back of the shirts. They wore the shirts at the student reception on the first night of MathFest, at which time they became known as the "black hole girls." Their enthusiasm was unbridled and contagious.

Advising students has been a major undertaking that is very demanding, but it is incredibly rewarding. It has been amazing to see our students change, knowing that we have played a small part in that change. ■

Julie C. Jones and Jacqueline A. Jensen are assistant professors of mathematics at Sam Houston State University. They are 2002-2003 Project NExT fellows and advisors for the SHSU MAA student chapter.

NIH Promotes a More Mathematical Biology

A recent article in *The Washington Fax,* a news and information service specializing in science policy (see http://www.washingtonfax.com), described a new project of the National Institute of General Medical Sciences (NIGMS), a component of the National Institutes of Health (NIH), with the goal of changing the culture of undergraduate biology by incorporating more mathematics and physics in the biology curriculum. The NIGMS proposes to sponsor, together with the Office of Science Education, workshops on how to integrate quantitative biology into undergraduate biology courses. The overall budget for the effort is planned to be at least $900,000. The plan is a response to a National Research Council report, Bio 2010 (http://www.nap.edu/catalog/10497.html), which recommended that colleges and

universities review their biology curricula to keep pace with current developments in the field. (For more about NIGMS programs, visit http://www.nigms.nih.gov.) A current MAA project, supported by both NIGMS and the Division of Undergraduate Education at NSF, aims to support the broad goals of this initiative by compiling examples of existing efforts towards enhanced undergraduate education that reduces barriers to interdisciplinary work. *Meeting the Challenges: Education Across the Biological, Mathematical and Computer Sciences* (http://www.maa.org/mtc), will also provide examples of research and industry activities that support the need to increase the number of interdisciplinary programs and produce a survey of the current status of such activities. ■

Iron Science Teacher!

The San Francisco Exploratorium has borrowed the format of the Japanese game show *Iron Chef* for a competition for science teachers, known, of course, as *Iron Science Teacher*. The competition, which is part of the Exploratorium's summer Teacher Institute, brings together the best science teachers to compete for audience applause. Teachers are given an "ingredient" which they have to work into their lesson. In the Fruitcake Challenge, for example, contestants had to use a fruitcake in their lesson. The competition is webcast at http://www.exploratorium.edu/iron_science/index.html. Visit the website for dates and other information. ■

Divisibility Tests Remembered

By Paul M. Cohn

Some recent articles in FOCUS (and the Editor's piece in the May/June issue) put me in mind of my first paper, written just 60 years ago. As a teenager I had been fascinated by numbers and of course, was familiar with the process of testing for divisibility by "casting out nines," as well as the less well known method of testing divisibility by 11 by forming the alternating sum of the digits. Thus, 1221 is divisible by 11 because $1 - 2 + 2 - 1 = 0$, but 12321 is not so divisible.

It occurred to me that one had a similar test for divisibility by 7: given any number, subtract twice the last digit from the rest; thus if the number is $N = 10a + b$, take $a - 2b$. This gives a reduction by a factor of 10 and after a few repetitions we can see if the result is divisible by 7. The explanation rests on the fact that 21 is divisible by 7. Thus, $N - 21b = 10(a - 2b)$ leaves the same remainder as N, so N is divisible by 7 precisely if $a - 2b$ is.

I thought no more about it until I read Hardy and Wright's classic [3], where the authors mention the tests for 9 and 11

and then say: "We know of one other rule only of any practical use," and they mention the fact that 7 x 11 x 13 = 1001, so one can test for divisibility by 7, 11 or 13 by subtracting multiples of 1001. For example, $479563 \rightarrow 79163 \rightarrow 76160 \rightarrow 7616 \rightarrow 1610 \rightarrow 161$, which is 7 x 23. The drawback is that one is usually left with a number in the hundreds. This encouraged me to send a note to the *Mathematical Gazette*, which was published in due course [1]. I also pointed out that the method is capable of generalization; for any number c we take a multiple of the form $10s + 1$ and subtract s times the last digit: $10a + b - (10s + 1) b = 10(a - sb)$. One can also take a multiple $10t - 1$ and add t times the last digit to the rest: $10a + b + (10t - 1)b = 10(a + tb)$. For example, to test for divisibility by 13, we simply add 4 times the last digit to the rest.

I felt very pleased with this achievement, until I went up to University and had occasion to consult Dickson's History [2]. There I found that "my" method had already been noted by a Russian 80 years earlier in [4]. Somewhat embarrassed, I

wrote to the Editor of the *Gazette t*o inform him of this fact, but to my relief he decided to do nothing about it. ■

References

1. Paul Cohn, Tests for divisibility, *Math. Gazette* **27** (1943), 28-29.

2. L. E. Dickson, *History of the Theory of Numbers*, Vol.1 Carnegie Institution 1919.

3. G. H. Hardy & E. M. Wright, *An Introduction to the Theory of Numbers,* Clarendon Press, Oxford 1938.

4. A. Zbikowski, *Bull. Acad. Sci. St Petersbourg* (3), **3** (1861), 151-153.

Paul M. Cohn is Emeritus Professor of Mathematics at University College London.

Ohio Masters of Mathematics

As part of the celebration of the Ohio's bicentennial, the Ohio Section of the MAA has created a web site entitled *Ohio Masters of Mathematics*. Designed to "foster public understanding, education, and appreciation of mathematics as a human endeavor and Ohio's contributions to that enterprise," the site contains biographical sketches of many Ohio mathematicians, including links to other sites when appropriate. You can visit the *Ohio Masters* at http://www.bgsu.edu/departments/math/Ohio-section/bicen/.

Awards for Student Presentations at MathFest 2003

Many undergraduate students presented papers at the 2003 MathFest. As usual the student paper presentations were interesting and the enthusiasm of the students was contagious. Nine of the student presentations received awards, and 23 of the students received travel grants to help them attend the meeting.

The winning presentations were:

Council on Undergraduate Research Award

Neil Hoffman	WILLIAMS COLLEGE	*Double Bubbles in Other Universes*

MAA Outstanding Presentations

Eric Bengtson	AUGUSTANA COLLEGE	*A Traffic Simulation Program*
Natalie Puckett	GRAND JUNCTION CENTRAL HIGH/MESA STATE COLLEGE	*Center of Art*
Moshe Cohen	BINGHAMTON UNIVERSITY (SUNY)	*New Results in Magic Square Enumeration*
Christopher Bay	TRUMAN STATE UNIVERSITY	*The Geometry of the Hausdorff Metric*
Kristina Lund	GRAND VALLEY STATE UNIVERSITY	*A Generalization of the Area Principle*
Andrew Baxter & Stephen J. Weaver	MILLERSVILLE UNIVERSITY	*Periodic Orbits in Triangular Air Hockey*
Ariana Dundon	POMONA COLLEGE	*Commutative Algebra, Part III: Local Rings with Controlled Formal Fibers*
Nicholas McClure	COLLEGE OF ST. BENEDICT/ST. JOHN'S UNIVERSITY	*A Competing Population Model for Mosquitoes*
Eric Engler	WILLIAMS COLLEGE	*Configuration Spaces, Part IV: Geometric Properties*

Dr. Joan Evans (second from the left) will present a paper at MET II in Washington, D. C. Her talk "On Pythagorean Triples" was prepared in collaboration with Dr. Llayron Clarkson, the distinguished Joseph A. Pierce Professor of Mathematics at TSU. The material should be accessible to a broad audience, including elementary and middle school teachers. Dr. Evans recently received her doctorate from Texas Southern University's School of Education. In collaboration with Professor Jacqueline Brannon Giles (board member of NAM and MAA) and her colleague, Dr. Nate Dean (NAM Vice President and math department head at TSU), she anticipates assisting in promoting professional involvement in NAM and MAA. In the photograph, Dr. Joan Evans discusses a group project at the HCC-Central MAA PREP workshop.

Is Progress an Illusion?

By Lynn Arthur Steen

(Adapted from a talk given at the annual Silver and Gold banquet that concluded MathFest in Boulder, Colorado, on August 2, 2003.)

In his introduction [MAA president] Ron Graham joked that in contrast to the youthful energy of Project NExT, some wags have begun calling the Silver and Gold banquet Project Last. What I'd like to do for the next twenty minutes or so is to go one step further and present Project Past — a glimpse at challenges facing our predecessors one hundred years ago. I do not intend to answer the question posed by my title, but instead to offer selected evidence that will help you decide for yourselves whether our sense of progress is real or illusory.

To focus this exercise, I looked only at the scientific literature of 1903 — exactly one hundred years ago. Here are examples, arranged as they appeared from January through November; all but two are from *Science*, the journal of the American Association for the Advancement of Science (AAAS):

Asaph Hall. "The Science of Astronomy." *Science*, 17:418 (January 2, 1903) 1-8.

Eliakim Hastings (E.H.) Moore. "On the Foundations of Mathematics." *Science*, 17:248 (March 13, 1903) 401-406.

G.A. Miller. "Some Fundamental Discoveries in Mathematics." *Science*, 17:430 (March, 27, 1903) 496-499.

Thomas M. Drown. "From High School to College." *Science*, 17:431 (April 3, 1903) 521-529.

Karl Pearson. "Homogeneity and Heterogeneity in Collections of Crania." *Biometrika*, 2:3 (June, 1903) 345-346.

S.W. Williston. "Specialization in Education." *Science*, 18:448 (July 31, 1903) 129-138.

Robert Simpson (R.S.) Woodward. "Education and the World's Work of Today." *Science*, 18:449 (August 7, 1903) 161-169.

C.M. Woodward. "The New Opportunity for Secondary Schools." *Science*, 18:451 (August 21, 1903) 225-233.

National Education Association. "Resolutions." *Science*, 18:452 (August 28, 1903) 283-284.

Karl Pearson. "On the Laws of Inheritance in Man." *Biometrika*, 2:4 (November 1903), 357-462.

Three of the authors (E.H. Moore, G.A. Miller, and R.S. Woodward) were mathematicians; two (Moore and Woodward) were presidents of the American Mathematical Society. The others were scientists, well known in their time: Asaph Hall was an astronomer, Thomas Drown a chemist, Karl Pearson a statistician, S.W. Williston a paleontologist, and C.M. Woodward an engineer who served in 1902-03 as president of the American Society for Engineering Education.

Three of these turn-of-the-century papers review major fields of study: Hall on astronomy, Miller on mathematics, and Pearson on what we now call genetics. I think we can stipulate that subsequent progress in these fields is not an illusion. With one exception, however, the other papers in this sample deal largely with educational matters where the issue of progress becomes more problematic. Let's imagine eavesdropping on a meeting in 1903 where leading scientists discuss educational problems. (Please bear with their masculine language which, although jarring to modern ears, was the language of the day.)

On educational practice: "The consensus of public opinion regards education as a series of routine performances ... involving tasks which students sometimes undertake with joy and sometimes with sorrow and ending for those who complete the program with a ceremony called graduation. I think it would be troublesome to explain just what is accomplished by this process and why a person

Lynn Arthur Steen

subjected to it may be called educated and one not so fortunate may be called uneducated." (R.S. Woodward, p. 162)

On mathematics curriculum: "In the schools algebra is taught in one watertight compartment, geometry in another, and physics in another. [The] student learns to appreciate (if ever) only very late the absolutely close connection between these different subjects and then, if he credits the fraternity of teachers with knowing the closeness of this relation, he blames them most heartily for their unaccountably stupid way of teaching him." (E.H. Moore, p. 410)

On school dropouts: "Not one half of the boys and girls in Boston ever get inside a high school. ... It is not because the people are poor — that excuse would cover but a small percent of the absentees — [nor] because they have not ample brains and average common sense. In my judgment, the best word to explain the nonappearance of over fifty per cent of boys and girls in our secondary schools is "incompatibility." There is a lack of harmony. The school does not give what the pupils want. …The average secondary school, if it prepares pupils for anything, prepares them for college; and since college is not for the majority, then secondary school is not for the majority. What

then is there for the majority? If they are to have secondary education at all, it must be something different." (C.M. Woodward, pp. 227-228)

Proposals

If these complaints sound slightly familiar, so do some of the proposed solutions. Here are three resolutions from the National Education Association (NEA), all from 1903, published (perhaps surprisingly) in AAAS's flagship journal *Science*:

On teacher pay: "Teaching in the public schools will not be a suitably attractive and permanent career, nor will it command as much of the ability of the country as it should, until the teachers are properly compensated and are assured of an undisturbed tenure during efficiency and good behavior. ... The compensation of the teacher should be sufficient to maintain an appropriate standard of living. Legislative measures to give support to these principles deserve the approval of the press and the people."

On taxation: "The true source of the strength of any system of public education lies in the regard of the people whom it immediately serves, and in their willingness to make sacrifices for it. For this reason a large share of the cost of maintaining public schools should be borne by a local tax levied by the county or by the town in which the schools are. State aid is to be regarded as supplementary to, and not as a substitute for, local taxation for school purposes."

On respect for legal procedures: "Disregard for law and for its established modes of procedure is as serious a danger as can menace a democracy. The restraint of passion by respect for law is a distinguishing mask of civilized beings. To throw off that restraint ... is to revert to barbarism. It is the duty of the schools so to lay the foundation of character in the young that they will grow up with a reverence for the majesty of the law. ... A democracy which would endure must be as law abiding as it is liberty-loving." (NEA, p. 284)

Pedagogy

The cited *Science* papers from 1903 are rich in opinion and specific suggestions for how to teach as well as cautions about how to judge the effectiveness of teaching — both topics still hotly debated today. For example:

On teaching mathematics: "As a pure mathematician I hold ...that by emphasizing steadily the practical sides of mathematics ... it would be possible to give very young students a great body of the essential notions [of mathematics]. ...

> *It is one of the happy signs of the times that teachers of all grades and all degrees of experience are trying to tell their brother and sister teachers how this and that subject can be taught...*
>
> *— Thomas M. Drown, 1903*

This is accomplished, on the one hand, by the increase of attention and comprehension obtained by connecting the abstract mathematics with subjects which are naturally of interest to the boy... and, on the other hand, by a diminuation of emphasis on the systematic and formal sides of the instruction in mathematics. Undoubtedly many mathematicians will feel that this decrease in emphasis will result in much, if not irreparable injury to the interests of mathematics. But I am inclined to think that ... under skillful guidance [the boy] will learn to be interested not merely in the achievements of the tools but in the theory of the tools themselves, and that thus he will ultimately have a feeling towards his mathematics extremely different from that which is now met with only too frequently ... a feeling that mathematics is merely a matter of symbols and arbitrary rules and conventions." (E.H. Moore, p. 408)

On evaluating teaching: "Character is the result of heredity and environment. To apportion the relative value of these influences in any case is no easy matter. If a school boy proves incorrigible it is generally attributed to heredity; if he becomes tractable, to environment — so easily do we let ourselves be persuaded as to the beneficial effect of our influence. ... The current drift of educational thought is towards the perfection of methods and of systems of teaching. It is one of the happy signs of the times that teachers of all grades and all degrees of experience are trying to tell their brother and sister teachers how this and that subject should be taught. ... And yet these sincere and devoted souls, who have their daily reward in the bright and responsive faces of their pupils, generally overlook the fact that their success is not due so much to their methods as to themselves." (Drown, p. 523-524)

Tests

As today the impact of tests is hotly debated — from the school-level tests required by the "No Child Left Behind" law to the college-prep AP and SAT tests mandated by competitive pressure of selective colleges — so in 1903 were the influences of educational examinations:

On school exams: "[In England] a committee was appointed 'to report upon improvements that might be effected in the teaching of mathematics...' One important purpose of the English agitation is to relieve the English secondary school teachers from the burden of a too precise examination system imposed by the great examining bodies." (E.H. Moore, pp. 406-407)

On college entrance exams: "Most of our larger eastern colleges still insist on their own entrance examinations. This makes a break in our education system which affects unfavorably the high school course preparatory to college, inasmuch as this course is then too apt to have for its aim the successful passing of examinations rather than a serious preparation for advanced work. This is an old and much-discussed question and I touch upon it now to assert my conviction that

… the diploma of graduation, accompanied by the personal statement of the principal, will become much better evidence of a boy's fitness to enter on college work than a few days written examination can be. … Whether or not he is likely to prove a diligent student with tastes and aptitude for his work, the college gets no indication from the examination papers…" (Drown, p. 522)

On admissions standards: "I urge only that every [pupil] … should have a motive for all he does. A motive, indeed, is more important than much knowledge, for it brings zeal, ambition, and earnestness, so often, so deplorably often, lacking in the college undergraduate. … We are too careful as to the kind and amount of preparation a student has when he enters college and too careless of the work he does while in college. Some of the best and most successful students I have ever known have been those whom the college rules would have excluded, while many a one who fulfills all technical requirements has been a dismal failure." (Williston, p. 134)

Programs

Today we are well aware of the many challenges associated with increasing numbers of students entering postsecondary education. In 1903 a similar expansion was taking place as the old classical curriculum fragmented into programs for students of different interests. Here are some implications, at least as seen through the eyes of one influential mathematician of the time:

On tracking: "There remain some controverted questions … which we cannot discuss without arousing prejudice which is attributed either to irrational conservatism on the one hand, or to sweeping iconoclasm, on the other. Even at the present day, many [hold] that studies may be divided into sharply defined categories designated as 'liberal,' 'humanistic,' 'scientific,' 'professional,' 'technical,' etc. … They say, by implication at least, that mathematics, when pursued a little way, just far enough to make a student entertain egotistic but erroneous notions that he knows something of the subject, is an element of liberal training. On the

other hand, if the student goes further and acquires a working knowledge of mathematics, his training is called professional or technical." (R.S. Woodward, p. 163)

On intercollegiate athletics: "There is a noisy minority who have succeeded, apparently, in convincing the public … that one of the principal functions of an educational institution is the cultivation of muscle. … There has sprung up, also, a class of less strenuous men who, taking advantage of the elective system, are pursuing courses of aimless discontinuity. … They toil not, except to avoid hard labor; neither do they spin except yarns of small talk … These types of men … are now wielding an influence distinctly inimical to academic ideals … Pray do not misunderstand me. … The ancient maxim of sound mind in a sound body is more fitting now than every before. … My protest is not against school and college athletics as such, but against athletics as they are now generally carried on, and especially against intercollegiate contests. As now practiced, athletics … cultivate almost exclusively the men who are usually more in need of intellectual training." (R.S. Woodward, pp. 166-167)

Data Analysis

Finally, as a bracing example of the cultural assumptions of the era as well as of the primitive state of data analysis just one century ago, I offer this extended passage from a commentary that statistician Karl Pearson wrote in *Biometrika* about a previously published review of a memoir dealing with the homogeneity of the Naqada prehistoric crania.

On statistics: "This is the material which the reviewer set himself to work out, taking the data haphazard from Flower's well-known catalogue of skulls in the Royal College of Surgeons' Museum. … The means of the variabilities of the skull lengths … is 6.2788 and of the skull breadths is 5.0804. Mixing Australians, Guanches, Eskimos, and Chinese [the reviewer] finds a variability of skull length = 8.389 and of skull breadth = 7.002. He then points to the differences (2.1102 and 1.9216) and triumphantly asks how such small differences can be of any importance!

"But had [the reviewer] had a mathematical training he would know that nothing is "small" absolutely, but only relatively to something else, and had he had a statistical training he would have known that he must compare it with the variability of these variabilities i.e., the standard deviation of the standard deviations of the skull measurements. Now the standard deviation of the above series of skull variabilities = .5185 and that of the skull breadth variabilities is .7996. The first "small" difference is therefore 4.07 times its standard deviation, the second is 2.40 times its standard deviation.

"In other words, whatever sort of group the Naqada, Bavarian, Aino, French, and English male cranial series make, the odds are 42,552 to 1 against such an excess of variability as [the reviewer] found for his mixed series of skull lengths belonging to a number of that series, and 121 to 1 against such an excess as he found for the skill breadths occurring in such a series! It is such odds as these, the combination of which can hardly fall short of 4,000,000 to 1 and which no sane man in practical conduct could disregard, that amount to "small" differences from the standpoint of the old school of craniologists!" (Pearson, p. 345-346)

Back to the Future

This passage shows in an explicit and sometimes startling way the nature of scientific thinking of this era, just one hundred years ago. In addition to demonstrating the roots of statistics in eugenics, it shows how undeveloped were scientist's understandings of variability and standard deviation. If we are searching for evidence of progress, this may be a good place to look.

With this I return you to 2003, to judge for yourselves the progress we may or may not have made and to imagine, based on present progress, what may be said on this subject one century hence.

Lynn Arthur Steen is Professor of Mathematics and Special Assistant to the Provost at St. Olaf College in Northfield, Minnesota. He was President of the MAA in 1985–86.

Secretary's Report

By Martha Siegel, Secretary of the MAA

The Board of Governors met as usual and welcomed new Governors: R. Peter DeLong, Joan Ferrini-Mundy, Nancy Hagelgans, Leon Hall, Thomas Hern, Luise-Charlotte Kappe, Laura Kelleher, Benjamin Klein, Reginald Luke, Donald Platte, William Stone, Dan Teague, and Betsy Yanik.

At this meeting, we had regular reports from the officers indicating that the MAA is in good financial shape, though in need of increased endowment funds. Unrestricted gifts to the Greater MAA Fund are the best way for members to increase the Association's endowment. Progress on the MAA Conference Center is proceeding with decisions about architects and permits that precede construction. New staff member Diane Vespucci will be coordinating staff efforts in conferences and buildings. Electric and plumbing repairs for the headquarters building are part of our regular plan for maintenance on our historic buildings in Washington, DC.

Several staff members have new positions: Roseann Brown is the MAA's first Director of Information Services; Eugene Darrell is Acting Finance Director, and Gretchen Brown is Sponsored Programs Manager. Our management software system is reducing our dependence on outsourcing and giving us more accurate and timely reports. Our on-line bookstore is doing well. The Associate Executive Director and Director of Publications displayed a variety of many new and interesting publications.

Grant activity at the MAA is at a high point, we have increased grants from half a million annually to three million annually in the last three and a half years. Executive Director Tina Straley acknowledged the contributions of Director of Programs and Services Michael Pearson and his staff, as well as the members of the MAA, for the innovative ideas that make our grant proposals successful. It was noted that ideas can be brought to the staff and help is available for those interested in applying for funds for MAA committee work and appropriate projects within our mission.

Professional Development is a major activity of the MAA. Our PMET and PREP workshops have been very well received and are very popular. Michael Pearson reminded the Board about the PREP Workshops, the availability of the SAUM assessment workshops for sections and the new Undergraduate Research Conferences awards program. Visit MAA Online often to check out the many opportunities available to you and your section.

Michael Pearson also announced the availability of innovative MAA Career Brochures for students that are being sold in bulk to colleges and universities, primarily, and may carry the institution's name on the cover if desired.

Our membership is holding steady, though we continue to think about ways to attract faculty at research I schools and their graduate students. We have a new Committee on Graduate Students, chaired by Louise Raphael of Howard University. I urge those with good ideas to contact Louise. We hope that many of our NExT Fellows can help us find new ways to attract graduate students. As Second Vice-President Joe Gallian reported, Project NExT is in its tenth year, and going strong. I can vouch for the fact that the newest Fellows are wonderful. It is a thrill to spend time with these talented, energetic, and enthusiastic new faculty members.

Our Associate Secretary, Jim Tattersall, never sits still. The program in Boulder was excellent and we already have meetings planned for many years in the future! The Board approved three more MathFests (subject to successful contract negotiations):

2006 MathFest in Knoxville, TN
August 10–12, 2006

2007 MathFest in San Jose, CA
August 3–5, 2007

2008 MathFest in Madison, WI
July 31–August 2, 2008.

We are already slated for Providence in 2004 and Albuquerque in 2005. And we are working on the 2015 MathFest location now, since that is our centennial year. A full calendar of approved meetings can be found on MAA Online.

I am pleased to announce that the Board approved the candidates presented by the Sections for Meritorious Service : Underwood Dudley (Indiana Section), Steve Ligh (Louisiana -Mississippi Section), Richard Barlow (Nebraska-SE South Dakota Section), Thomas Hern (Ohio Section), and John Kenelly (Southeastern Section).

The Board confirmed the three winners of the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics: Thomas Garrity (Williams College), Andrew Chiang-Fung Liu (University of Alberta), and Olympia Nicodemi (SUNY at Geneseo). Awards will be presented in Phoenix.

The 2003-2005 George Pólya Lecturer will be Martin Isaacs of the University of Wisconsin; Alan Schoenfeld of the University of California at Berkeley will be the Leitzel Lecturer for MathFest 2004; and the Hedrick Lecturer for MathFest 2004 will be Peter Sarnak of Princeton University.

The Board elected new Editorial Boards for *The College Mathematics Journal* and *Math Horizons*. They will serve five-year terms starting January 1, 2004 under incoming editors Lowell Beineke for *CMJ* and Art Benjamin and Jennifer Quinn for *Math Horizons*.

James W. Daniel was elected to another four-year term on the Audit and Budget Committees, to serve from the end of the meetings in January 2004 to the end of the meetings in January 2008.

The Board elected Frank Farris of Santa Clara University and Editor of *Mathematics Magazine* to serve a two-year term as the Editor on the Executive Committee with a term to commence January 1, 2004 and to end December 31, 2005.

Steven Dunbar, Director of Competitions, gave the 2003 IMO news from To-

kyo: USA took third place. Bulgaria was first, and China placed second. The US team won four gold and two silver medals. The students did very well on very difficult problems. Dunbar reported that the Mathematical Olympiad Summer Program (MOSP) went very smoothly this year and will be expanded to 60 students in 2004 (courtesy of Akamai). As a form of outreach, the American Mathematics Competitions will send out 10,000 of the MAA Career Brochures to high schools with AMC 10 and 12 contest materials.

The Board agreed to change the due date for Haimo Award nominations from February 1 to March 1. Sections should take special note of this.

The long-awaited Report from the Committee on the Undergraduate Program in Mathematics has been approved by the Committee on Reports for publication. Its six major recommendations (along with explanatory material) gained the approval of the Board. The Board expressed its thanks to CUPM and its chair, Harriet Pollatsek, for seeing this massive project to completion.

The Business Meeting was held on Saturday of MathFest and members of the MAA voted on the various Bylaws changes presented to the membership earlier in the year. There were several amendments to the proposals and the exact text of the revised Bylaws as approved by the membership at the Business Meeting can be found on MAA Online. Another Bylaws change related to financial matters and investments will be presented to the membership at the Business Meeting in Phoenix. (See page 21).

Thanks to Associate Secretary Jim Tattersall, the Program Committee chaired by Art Benjamin, the Local Arrangements Committee chaired by Marty Walter, and the AMS Meetings staff. This MathFest was a great success. Be sure to join us next summer in Providence! ◼

Eight Hours with the Board

By Mark Daniel Ward

The thought of an eight-hour committee meeting amongst dozens of mathematicians makes most people shudder. So why was I excited to be in such a meeting on July 30 in Boulder? Each year, one graduate student is invited to observe the MAA Board of Governors meeting and then reflect on the experience in FOCUS. When I received an invitation to fill this role during MathFest 2003, I was honored. What follows are some highlights (the agenda was over one hundred pages), from the viewpoint of a graduate student.

The meeting was held in the Grand Ballroom at the Millennium Harvest House Hotel. A continental breakfast was served at 8:15 am, and then the meeting started at 9 am. After introductions, MAA President Ron Graham reflected on his first six months in office. In particular, he was delighted to see the participation of students throughout the various sections. He also discussed the gift of Paul and Virginia Halmos that will allow the MAA Carriage House in Washington to be converted into a conference center. Next, John Kenelly and Dan Maki discussed the budget. In particular, they mentioned the changes made for compliance with a recent NSF audit. They said that the finance team is like a duck — it looks smooth and graceful, but it is paddling like crazy underneath. MAA Secretary Martha Siegel said that the electronic voting for MAA officers went very well, and electronic voting will continue in national elections. Then Jim Tattersall, who is Associate Secretary and in charge of organizing meetings, announced pro-

posed sites for the next three MathFests; all were unanimously approved. Carl Cowen gave a report on the Canadian Math Society meeting held in June. Several reports on externally funded projects followed. Everyone took a fifteen-minute break from 11:00 to 11:15. Prizes, elections, and nominations were voted on until lunch at noon. All guests were asked to leave during this time, so I have no idea what happened!

During lunch, we discussed a variety of topics. At many tables this included ways to increase the involvement of graduate students in the MAA. After lunch ended at 1 pm and everyone returned to the meeting room, the entire Board of Governors briefly continued this discussion. Then the Washington office staff gave a variety of brief reports; just a few of which are mentioned here. Tina Straley discussed the first MAA International Study Tour to Greece. She also advertised the second tour, to be held during spring 2004 in England (I made a mental note to mention this to my wife, who is working on her Ph.D. in English. Families are welcome!). Don Albers provided comic relief as he presented new books and software with lots of flair. Fernando Gouvêa solicited articles for FOCUS (which are always welcome!) and reviews of books. He also discussed the complexities of managing the MAA Online. Then the Committee on the Undergraduate Program in Mathematics (CUPM) Report was considered. After much discussion, the six recommendations made by the CUPM Report were unanimously approved.

Finally, the Board of Governors thanked Woody Dudley for his many years of service in editing the *College Mathematics Journal.* I admire the dedication and service exhibited by the many individuals at the Board of Governors meeting. So the note of congratulations to Dr. Dudley was a perfect conclusion to the meeting.

As a member of the MAA Committee on Graduate Students, I am constantly soliciting advice about how to get more graduate students enrolled and active in the MAA. We are delighted when graduate students attend sectional and national meetings, often presenting the results of their research. They are also perfect candidates for mentoring undergraduates in mathematics. Graduate students who get involved in the MAA are rewarded with a myriad of professional benefits, including contacts with prospective employers and the opportunity to read and publish papers in a wide variety of journals. The MAA often sponsors activities aimed specifically at graduate students; for instance, at this MathFest our committee offered a workshop for faculty members who will be involved in training TAs. We hope faculty members will encourage their graduate students to get involved with the MAA. Any suggestions are greatly appreciated. ◼

Mark Ward is a graduate student at Purdue University. He can be contacted at (mward@math.purdue.edu).

A Boy That Really Counts

On August 9, 2003 Jennifer Quinn had a baby boy, Zachary Vincent Quinn Martin, 8 pounds, 8 ounces, and 8 days after she was supposed to give an invited address at MathFest! Although she could not come to Boulder to give her MathFest talk (called "Proofs That Really Count"), she presented almost half of the talk on videotape. Her co-author, Art Benjamin, worked Jennifer's computer and filled in the remaining details of the talk. ◼

MathFest in Photos

Art Benjamin and Ron Graham, and Proofs That Really Count. *Photograph provided by Art Benjamin.*

Len Gillman accepts one more Lester R. Ford Award. Photograph by Patrick Dale McCray.
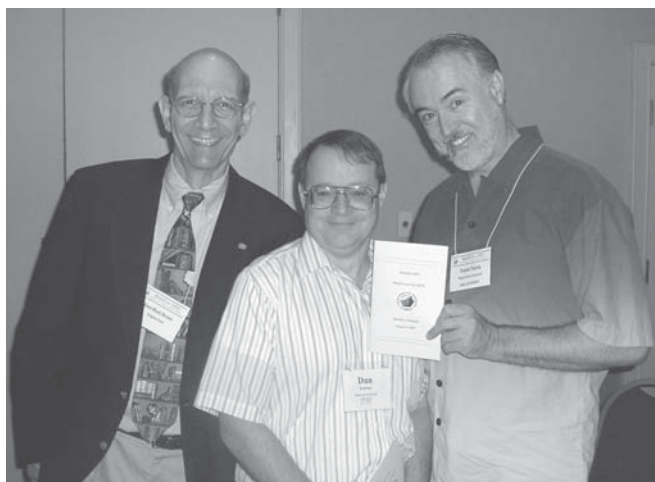
Frank Farris, right, editor of Mathematics Magazine, *with the winners of the Allendoerfer Award, Ezra Brown, left, and Dan Kalman. Photograph provided by Frank Farris.*

John dePillis gets people talking about 777 Mathematical Conversation Starters. *Photograph by Art Benjamin.*

Art Benjamin does number magic. Photograph provided by Art Benjamin.

Ye editor speaks to the Board of Governors. Photograph by Art Benjamin.

Doris Schattschneider and her book on M.C. Escher's Legacy. Photograph by Frank Farris.

John Jungck and a model of a DNA molecule at the minicourse on Bioinformatics. Photograph by Patrick Dale McCray

Manjul Bhargava accepts the Hasse Award. Photograph by Patrick Dale McCray.

About a third of the MAA Committee on Publications: Don Albers, Deanna Haunsperger, Woody Dudley, Elaine Pedreira, Beverly Ruedi, Lowel Beinecke, and Lang Moore. Photograph by Frank Farris.

PMET Activities Open on Four Fronts

By Bernie Madison

Strengthening the mathematical education of America's teachers is the immediate goal of the NSF-funded MAA project called *Preparing Mathematicians to Educate Teachers* (PMET). The primary lever for PMET in achieving this goal is to assist college and university mathematics faculty in providing better courses for future K-12 teachers. During the first eight months of PMET's four-year term, 105 faculty have participated in PMET workshops, eighteen have attended a PMET minicourse, and numerous others have been encouraged to join PMET's effort.

PMET workshop participants at Appalachian State, August 2003.

An extensive series of workshops and minicourses for college and university faculty is the central PMET activity and the first to get into full swing. However, the other three components — information and resources dissemination, mini-grants, and regional networks — have begun and are gathering steam.

Four PMET workshops — all fully subscribed — were held during this past summer, three for faculty teaching future elementary teachers and one for faculty teaching future high school teachers. The elementary workshops were held in California (Patrick Callahan, leader), Nebraska (Ruth Heaton and James Lewis, leaders), and North Carolina (Holly Hirst and David Royster, leaders). The two-summer extended high school workshop was in New York (Jack Narayan and Stephen West, leaders) and will have its second and final session next summer.

Another two-summer high school workshop (Ed Dubinsky and Kathy Heid, leaders), funded by MAA's PREP program and a pilot for PMET, began in summer 2002 and finished in summer 2003.

Eight new workshops are scheduled for 2004 (see box on page 19). Because of this expanded offering, more leaders are needed for 2004 and even more will be needed for 2005. Consequently, in addition to workshops for college faculty, PMET has held two workshops for workshop leaders.

PMET's plans include workshops for college faculty on providing professional development opportunities for in-service K-12 teachers, anticipating that these workshops could be developed in collab-

oration with others, possibly state systems. No collaborations have emerged, due in part to the economic problems in most states. For the present, the emphasis will remain on pre-service teacher education.

A series of mini-courses aims at laying the foundation for workshop participation and to sensitize additional faculty to some of the critical problems in the mathematical education of teachers. Mini-courses will be proposed for all MAA national meetings and will be offered at some MAA section meetings. The first mini-course, led by Jack Narayan and Phyllis Chinn, was presented at MathFest 2003 in Boulder, CO last summer. Another PMET minicourse is scheduled for the Joint Mathematics Meetings in Phoenix in January 2004 with Jack Narayan and Holly Hirst as leaders.

The first call for PMET mini-grant proposals was issued last summer with a deadline of October 15. During this round, approximately $75,000 will be awarded in grants of $2000 - $5000 to teams of mathematicians and education specialists. Each mini-grant project must aim at improving courses for future

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PMET Needs Your Help

- PMET includes an effort to gather and organize material providing examples of specific mathematics concepts that arise naturally in K-12 teaching but are not well treated in the undergraduate programs for teachers and are difficult for pre-service or in-service teachers. Send examples to Ed Dubinsky (edd@mcs.kent.edu).

- The PMET website includes a selected annotated bibliography on PMET-related issues as well as a calendar of PMET-related meetings. The site will also provide links to or post information about resource materials on the mathematical education of teachers. Such information includes textbooks, reviews of textbooks, supplementary curricular materials, innovative teacher education projects or programs, and professional meetings. Suggestions for such links or posting should be sent to the PMET project office (bmadison@uark.edu).

teachers as well as promoting stronger mathematical education of teachers within the grantees' department(s) and institution(s). This process will be repeated in 2004 and again in 2005.

PMET aims at elevating the priority that is placed on teacher education by mathematical science departments. One way of doing this is by a broad-based information and resource dissemination effort. So far, several panels at professional meetings of other organizations have been presented or scheduled, a website (http://www.maa.org/pmet) has been constructed, a first-contact brochure has been printed and distributed widely, and several collaborative efforts have been initiated. The website will be a central source of information for both the project and for resources on teacher education. Suggestions for links to other relevant sites, curricular materials, reviews of curricular materials, and other efforts in teacher education are being solicited (see the box on page 18).

Regional networks are being developed around the five states in which PMET is concentrating initial activities — California, Nebraska, New York, North Carolina, and Ohio. These networks are aimed at energizing, coordinating, and sustaining efforts within the regions.

PMET officially began February 1, 2003, with the awarding from NSF of expected funding of $3 million (NSF DUE - 0230847) to the MAA with sub-awards to the University of Arkansas and Kent State University. PMET has additional support from Texas Instruments in both

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PMET 2004 Schedule of Workshops

For preparing future elementary teachers:
Humboldt State University, Arcata, CA - Phyllis Chinn and Dale Oliver, Leaders
University of Nebraska, Lincoln - Ruth Heaton and James Lewis, Leaders
Kent State University, OH - Michael Battista and Olaf Stackelberg, Leaders
State University of New York at Stony Brook- Kathy Ivey and Alan Tucker, Leaders

For preparing future middle school teachers:
Appalachian State University, Boone, NC - Holly Hirst and David Royster, Leaders
Bowling Green State University, OH - Thomas Hern and Barbara Moses, Leaders

For preparing future high school teachers:
University of San Diego, CA- Magnhild Lien and Perla Myers, Leaders
State University of New York at Oswego - Jack Narayan and Stephen West, Leaders

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funds and use of TI equipment for workshops. The MAA's Committee on the Mathematical Education of Teachers is the sponsor of PMET, and the CBMS report, *Mathematical Education of Teachers* (MET), is the basis for the PMET philosophy.

PMET National Advisory Committee

Richard Askey, University of Wisconsin-Madison (Emeritus)
Richelle M. Blair, Lakeland Community College (Emeritus)
Ronald L. Graham, University of California at San Diego
Kati Haycock, The Education Trust
Jeremy Kilpatrick, University of Georgia
Dale R. Oliver, Humboldt State University
Richard Schaar, Texas Instruments
Richard L. Scheaffer, University of Florida (Emeritus)
Annie Selden, Tennessee Technological University (Emeritus)
Tina H. Straley, Mathematical Association of America
Zalman Usiskin, University of Chicago
Irvin E. Vance, Michigan State University
Hung-Hsi Wu, University of California at Berkeley

PMET Workshops Advisory Committee

Richard Bayne, Howard University
Douglas H. Clements, University at Buffalo, SUNY
Chris Franklin, University of Georgia
A. Susan Gay, University of Kansas
Deborah Schifter, Educational Development Center

PMET is managed by the MAA office in Washington, a project office at the University of Arkansas, and an office for workshops at Kent State University. Bernard Madison (University of Arkansas) and Alan Tucker (SUNY at Stony Brook) are Project Co-directors and Ed Dubinsky (Kent State University) is Associate Director for Workshops. They are advised by a National Advisory Committee and a Workshops Advisory Committee (see the box at the bottom of this page).

As an extension of information dissemination and establishing support networks, PMET seeks to collaborate with other like-minded efforts to improve teacher education. Parties interested in pursuing possible collaborations are invited to contact the PMET project office or one of the project directors. Contact information is available at http://www.maa.org/pmet.

The external evaluation of PMET is being directed by Peter Ewell, Vice President of the National Center for Higher Education Management Systems of Boulder, CO. The ultimate goal of PMET — better mathematical education of America's K-12 students — is two steps removed from the main focus of PMET's efforts, college and university faculty. Consequently, authentic end results of PMET's efforts will require an extended and complex evaluation effort. No such extension is possible under the current project's plans and funding, but the PMET leadership is discussing design of such an effort with Dr. Ewell. ◼

MAA Board of Governors Approves Two Resolutions

At the July 2002 MathFest meeting in Burlington, VT, the MAA's Board of Governors approved two resolutions. The first dealt with dual enrollment, through which high school students simultaneously receive high school and college credit for courses taught in high school, usually by high school teachers. It is a growing national phenomenon. The Board of Governors of the Mathematical Association of America recommends that dual enrollment courses in mathematics should meet the same academic standards as other courses of the post-secondary departments and programs that grant the dual enrollment college credit.

The second resolution deals with staffing. The CBMS2000 survey detected a substantial shift between fall 1995 and fall 2000 in the way that colleges and universities staff their mathematics departments and programs. The Board of Governors of the Mathematical Association of America recommends that in staffing their programs, mathematics departments and programs not run counter to the MAA ("Guidelines for Programs and Departments in Undergraduate Mathematical Sciences.") [2]

Passed at the Burlington meeting of the Board of Governors, July 2002:

Dual enrollment, through which high school students simultaneously receive high school and college credit for courses taught in high school, usually by high school teachers, is a growing national phenomenon. The CBMS2000 survey (1) reports that almost 15% of all two-year college sections of College Algebra, Pre-calculus, and Calculus I in fall 2000 were taught via dual enrollment.

The Board of Governors of the Mathematical Association of America recommends that dual enrollment courses in mathematics should meet the same academic standards as other courses of the post-secondary departments and programs that grant the dual enrollment college credit. In particular, the Board

recommends that instructors in dual enrollment mathematics classes meet the mathematics educational requirements outlined in the MAA Departmental Guidelines [2, Sections C.1.a and C.2]. document. The Board further recommends that the mathematics program or department supervise the choice of textbook, the course syllabus, the design of the final examination, and the choice of the course instructor in the dual credit course to the same degree that it supervises those aspects of mathematics courses taught by other part-time faculty. Finally the Board recommends that future CBMS surveys continue to track the growth of dual enrollments and study the academic issues outlined above.

[1] Lutzer, David J., Maxwell, James W., Rodi, Stephen B. *Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States*. Fall 2000 CBMS Survey. Providence, RI: American Mathematical Society (2002), pages 64–66. For the full report go to: http://www.ams.org/cbms/.

[2] *Guidelines for Programs and Departments in Undergraduate Mathematical Sciences*, Washington, DC: Mathematical Association of America, August 2000, Sections C.1.a and C.2.a, b, c, page 3.For the full report go to: http://www.maa.org/guidelines/welcome.html.

Passed at the Burlington meeting of the Board of Governors, July 2002

The CBMS2000 survey detected a substantial shift between fall 1995 and fall 2000 in the way that colleges and universities staff their mathematics departments and programs. In mathematics departments of four-year colleges and universities, there has been a marked decline in the number of tenured or tenure-track faculty, coupled with a substantial increase in part-time faculty and in full-time faculty who are neither tenured nor tenure-eligible. In the mathematics programs of two-year colleges, there has been a decrease in the number of faculty on the permanent full-time roster, coupled with a substantial increase in temporary full-time faculty and part-time faculty.

Over-reliance on temporary faculty (whether part-time or full-time) can decrease stable and continuous faculty involvement in course and curriculum development, peer teaching review, student advising, and departmental governance, and simultaneously lead to a shift of responsibility for out-of-class departmental duties into the hands of fewer permanent faculty members. In addition, the CBMS2000 survey shows that temporary faculty tend to have a lower level of graduate education in the mathematical sciences than do permanent faculty, and widespread use of non-doctoral faculty can have an adverse effect on the intellectual life of the department. Finally, a decline in the number of permanent faculty positions can disrupt the professional development of new PhD recipients who are forced to be in job-search mode year after year, as they move from one temporary position to another.

While recognizing that faculty who are neither tenured nor tenure eligible can make make significant contributions to mathematics departments and programs, the Board of Governors of the Mathematical Association of America recommends that in staffing their programs mathematics departments and programs not run counter to the MAA Departmental Guideline [2, Section C.6] concerning over-reliance on part-time faculty.

The Board further recommends that the staffing shift described above continue to be monitored carefully by future CBMS surveys. ■

New Columns on MAA Online

How Euler Did It, by Ed Sandifer

Math Games, by Ed Pegg

Check them out at http://www.maa.org

Proposed Change in MAA Bylaws

Meeting at the 2003 MathFest, the Board of Governors of the Association voted to propose the following changes to Article IX of the MAA bylaws. This article deals with the financial administration of the Association. The proposed changes will be voted on at the MAA Business Meeting to be held on January 10 at the Joint Mathematics Meetings in Phoenix.

The goal of the proposed changes is to clarify several points relating to investments and financial matters. The current bylaws are less than clear — perhaps even self-contradictory — on certain points. The main conflict arises from the statements that the Treasurer is responsible for the control and administration of all investment funds (IX.1) and that the Investment Committee can trade securities (IX.8). The main suggested changes are:

1. Modify the responsibilities of the Investment Committee by: removing the authority to make investment decisions; requiring it to recommend broad investment policy for approval by the Board of Governors; requiring it to review regular reports from the Treasurer on investments and investment transactions; and making the Treasurer a member of the committee.

2. Clarify that the Executive Committee and Treasurer must follow the Board of Governors-approved investment policy and that the Treasurer is subject to the direction of the Executive Committee on investment matters.

3. Clarify that the Treasurer: has the authority, subject to the direction of the Executive Committee and in accordance with the Board of Governors-approved investment policy, to sell/buy/trade investment holdings; may share or delegate some or all of that authority to one or more entities with the approval of the Executive Committee (this could include members of the Investment Committee, professional fund managers, et cetera); shall at least quarterly provide the Investment Committee detailed reports on investments and investment transactions.

4. Clarify that investment transactions by the Executive Director are subject to the prior approval of the Treasurer.

Below is the full Article IX of the bylaws with proposed changes. Deletions are ~~struck out~~, while insertions are underlined.

Article IX—Financial Administration

1. The deposit, investment, and disbursement of all funds shall be subject to the direction of the Executive Committee. The Executive Director shall be custodian of the current operating funds. The Treasurer shall be responsible for the control and administration of all investment funds; endowment, trust, and gift funds; and such other funds as the Board may designate. <u>Subject to the direction of the Executive Committee and in accordance with the Board-approved investment policy of the Association, the Treasurer shall have the authority to buy, sell, and exchange investments in such funds. With the prior approval of the Executive Committee, the Treasurer may share or delegate some or all of that authority to buy, sell, and exchange investments. The Treasurer shall at least quarterly provide detailed reports to the Investment Committee on all funds and fund transactions.</u>

2. All incoming funds shall be received by the Executive Director, entered in the Association's books, and deposited or<u>, after approval by the Treasurer,</u> invested as shall have been prescribed by the Executive Committee <u>in accordance with the Board-approved investment policy of the Association</u>. The Executive Director shall keep proper accounts of all financial transactions of the Association.

3. The accounts of the Association shall be audited annually by a certified public accountant (the auditor). There shall be an Audit Committee, a subcommittee of the Executive Committee, consisting of two members each elected by the Board in alternate even-numbered years for a term of four years. The Audit Committee shall be responsible for selecting the auditor, receiving the report of the auditor, and making recommendations based on the auditor's report to the Executive Committee.

4. The Executive Committee shall annually prepare a budget allocating funds of the Association for the purpose of carrying out the objectives of the Association and present this budget to the Board for action.

5. The Executive Director, the President, and the Treasurer are empowered and authorized to sign, on behalf of the Executive Committee, contracts that are required for the conduct of the Association's activities specifically provided for in the approved annual budget.

6. Checks drawn on the accounts of the Association shall bear the signature of any one of several individuals whom the Executive Committee shall have authorized to sign checks on behalf of the Association.

7. The fiscal year of the Association shall be from January 1 through December 31.

8. There shall be an Investment Committee, a subcommittee of the Executive Committee<u>, of which the Treasurer shall be a member. The Investment Committee shall recommend a broad investment policy for the Association, and changes thereto, to the Board for approval. The Investment Committee shall at least quarterly review and when appropriate report to the Executive Committee on detailed reports from the Treasurer on all funds and fund transactions involving investment funds; endowment, trust, and gift funds; and such other funds as the Board may designate.</u> ~~The Investment Committee shall make recommendations to the Executive Committee on the investment of the Association's funds and on financial questions. The securities of the Association may be bought, sold, or exchanged upon the oral orders of members of the Investment Committee who have been given this authority by the Investment Committee.~~ ■

NSF Beat, November 2003
New Adaptation and Implementation Awards

By Sharon Cutler Ross

A continuing agent for change in curriculum and instruction is the NSF's Division of Undergraduate Education Course, Curriculum, and Laboratory Improvement (CCLI) program. This program continues to support the development of curriculum materials, the dissemination and adaptation of these materials, professional development opportunities, and the purchase of instrumentation. A newer track in this program supports the development, adaptation, and dissemination of improved assessment practices.

The Division of Undergraduate Education has recently announced awards in the Adaptation and Implementation (CCLI-A&I) track. Both broad and medium focus projects appear in this round of funding.

"Creating a National Initiative to Refocus the Courses Below Calculus," SUNY Farmingdale (S. Gordon, PI) is part of a collaborative effort of the MAA, AMATYC, and NCTM to lead a national movement to reconceptualize and restructure college courses before calculus, especially college algebra and precalculus. The goals of this project are to identify challenges to be overcome and strategies for doing so. These include influencing not only the mathematics community, but also state agencies, enlisting the support of other stakeholders, and developing faculty training efforts.

At Dartmouth College, "Multiplying the Effects of Reform," (D. Wallace, PI) will facilitate the dissemination and adaptation of materials and resources to improve quantitative literacy. A primary activity will be tracking and evaluating the use of online modules developed by members of the National Numeracy Network. Project personal are also working with the Network and the MAA to disseminate successful approaches through workshops.

More local projects focus on specific blocks of courses or the use of technology support in a range of courses. "Core Mathematics," (G. Krahn, PI), US Military Academy, will adapt COMAP's *Principles and Practice of Mathematics* in a four-semester sequence that will emphasize problem solving through modeling and inquiry. The stress on real-world, problem-based instruction is intended to produce competent, confident problem solvers familiar with a broad variety of mathematical tools.

"Enhancing the Mathematical Foundation of Students through Online Course Modules," (P. Giurgescu, PI), Pace University, will adapt NSF-funded projects for students in Finite Mathematics, Introductory Calculus, and Elementary Statistics. These adaptations will form the basis of a series of online modules that present the mathematics in relevant contexts and give opportunities for hands-on mathematical experimentation.

Three statistics courses at Central Michigan University (C. Lee, PI) will be revised to adapt, implement, and evaluate an activity-based, cooperative-learning, and technology curriculum. The courses which focus on the mastery of fundamental statistical reasoning skills are designed for non-majors and K-12 prospective teachers. An added benefit of this large-scale project will be its impact on the teaching practices of the graduate teaching assistants involved.

Two projects will adapt the WeBWorK homework assessment system. At California State University, Long Beach, "Implementing WeBWorK in a Teacher Training Curriculum," (A. Segalla, PI), will develop partnerships with faculty at two other colleges for collaborative work in using WeBWorK in preservice courses. In addition to strengthening these courses, the embedding of technology in them will improve the technological literacy of students (and instructors) and produce a cadre of teachers who will use WeBWorK and train others in their schools.

The other implementation of WeBWorK is in the Pacific Lutheran University project (B. Dorner, PI) that will introduce WeBWorK and Maple into the first two calculus courses. An important feature of the project is the systematic approach of the entire department to establish student-learning goals and to employ technology to achieve these goals.

Technology also plays a key role in "A Sophomore-Level Transition Course,"(M. Jones, PI), Montclair State University. The project will introduce applications early in undergraduate coursework in order to have students explore the mathematical process, use advanced mathematical software, acquire experience with elementary proof techniques, and be better prepared for higher-level courses.

Technology will be applied in a different way in the Montgomery College – Rockville project, "Writing to Learn Mathematics at the Developmental Level," (M.K. Abbey, PI). Students will use a writing software program to demonstrate their understanding of mathematical concepts by writing expository essays. Critical literacy and communication skills will be practiced in the setting of mathematical problem solving.

At the writing of this article the details of one other A&I award were being negotiated.

The deadline for the next round of Application and Implementation proposals is December 4, 2003. ■

Barbara Beechler: Remembering a Very Dear Friend

By Mario Martelli

The MAA and its Southern California Section lost one of their most valuable supporters when Barbara Beechler succumbed to complications from cancer on March 18, 2003. Barbara was born in Rockford, Illinois, on December 13, 1928 and grew up during the depression. She received a BA in Physics in 1949 and a Ph.D. in Mathematics in 1955 from the University of Iowa. Her thesis was in the area of commutative rings. After two years as instructor at Smith College, Barbara served for five years as associate professor and chairman of the mathematics department of Wilson College in Chambersburg, PA. In 1960 she moved to Wheaton College in Norton, Massachusetts and in 1967 she joined the faculty of Pitzer College in Claremont, CA. She later became the first female tenured faculty member of the college.

Barbara worked tirelessly to foster collaboration and understanding among the five undergraduate colleges in Claremont and the Claremont Graduate School. She was considered the mother of the Claremont Mathematics Colloquium. She frequently hosted, at her house on Ninth Street, the reception following this weekly event. She was a very demanding professor and wanted every Pitzer mathematics major to be well prepared, but she combined this desire with a strong commitment to her students.

In 1989 Barbara retired from Pitzer after being diagnosed with throat cancer. She had been a member of the MAA since 1950, but at this point she became very active in the association, particularly in the Southern California Section. From 1990 to 1996 she served as Section Secretary-Treasurer, Meeting Coordinator and Newsletter Editor! I vividly remember planning with her the 1995 joint meeting with the Northern California Section to commemorate 70 years of presence of the MAA in California. She said that the 75th anniversary would have come in the year 2000 and there were going to be too many celebrations at that time! The meeting took place in San Luis

Barbara Beechler

Obispo and was an event that everybody remembers for the caliber of the speakers, the undergraduate student poster session and a host of other interesting activities. When Barbara took over the duties of Secretary-Treasurer the finances of the Southern California Section were in disarray. When I succeeded her in 1996 as Secretary-Treasurer, the section was in very good financial health. She had worked hard in the selection of the meeting sites and of the speakers to keep the costs down and build up the finances of the section.

The Southern California Section nominated Barbara for the MAA Certificate of Meritorious Service. She received this award during the Joint Meeting in San Francisco in January 1995. From 1993 to 1997 she was a member of the Development Committee and from 1995 to 2001 she was a member of the Committee on Sections. While serving the MAA on the national level, she did not neglect her beloved section. She was elected as our Governor for the period 1998 -2001.

With her health already deteriorating she had great difficulty attending local and national meetings, but she came whenever she could. I remember the MathFest

in Burlington during August, 2002. Barbara, my student Carrie Staples, and I had a great time during the dinner and boat trip on Lake Champlain. The last day of the meeting I rented a car to take Barbara around the lake. We visited the northern part and came back to Burlington with a ferry from the New York side. Barbara took some great pictures that I will treasure forever.

Barbara was among the largest MAA donors during her life and left a substantial part of her estate to the Association. As with all the important monetary contributions she made during her life, she did not want anybody to know about her plans. She financially supported the Undergraduate Student Poster Session, but she always asked me to keep her donations anonymous. Tina Straley, the Executive Director of the MAA, has said repeatedly that she would have liked to have known of Barbara's intentions, so that the MAA could have honored her appropriately while she was alive. Barbara did not see it that way. Nobody really knew, although many of us suspected, that her will was going to benefit the MAA a great deal. She had always been one of the largest donors of the Association and of the Southern California Section. While I was Secretary-Treasurer and served two times as program chair, Barbara frequently provided the financial support to invite very good speakers to our meetings. She always asked me to keep her contributions confidential. I was not surprised when I found out about her last donation to the MAA.

I am sure that she is looking at this article with a bit of disappointment. "Kid," she is telling me, "you are not supposed to say these things." But, for once, I have decided to go against her desires. I want everybody to know what a great person and invaluable member of our community Barbara had always been. With her departure I, and many others with me, have lost a great friend, and the MAA has lost one of its most valuable supporters.

Letters to the Editor

Allegheny Mountain Section Teaching Award

In the August/September issue of FOCUS, pages 14 and 15, the section award winners for distinguished teaching are listed. In addition it was stated that the Allegheny Mountain section did not make an award. Please be aware that this is not correct. As a matter of fact, I won that award.

Michael W. Botsko

Michael W. Botsko
Saint Vincent College

On pp. 14-15 of the August/September 2003 FOCUS, it is stated that the Allegheny Mountain Section did not make an Award for Distinguished Teaching of Mathematics in 2003. I am pleased to report that the section did indeed present the 2003 Award for Distinguished Teaching of Mathematics to Michael Botsko, Professor of Mathematics at Saint Vincent College.

Tamara Lakins
Chair, Allegheny Mountain Section
Allegheny College

We're sorry for the mistake! Somehow, the information on the Allegheny Mountain Section award never reached us. I'll take this opportunity to encourage all MAA sections to send information on their teaching awards to FOCUS (and, of course, to the Haimo Award committee). Our yearly report on the section teaching awards usually appears in the September issue (deadline July 15); please remember to send us a photograph of the winner.

Textbook Recommendations

Today I came across an issue of *UME Trends* from November 1995. In it is a great two-page article by Elsa Newman entitled "Project NExT Textbook Recommendations" (p. 14-15). Even though it's almost 8 years old the recommendations are still quite good. This is just to suggest that sometime someone (not me, unfortunately) should write a similar article for FOCUS, with recommendations of texts for key courses. It would be very well received and would be a real service to the MAA community. The *Basic Library List* is available at MAA online but it's now more than a decade old and isn't as useful as it used to be.

Peter Ross
Santa Clara University

I hope that the article on number theory textbooks in our September issue is a first step in this direction. As I said then, I am actively looking for similar articles on texts for other courses. The article has generated several responses, which I interpret as meaning that our community really does want to see articles of this kind.

This is a good opportunity to admit that yes, the listings from the old Basic Library List are online at http://www.maa.org/bll/home.html. *Users should be cautioned, however, that this is definitely in the "under construction" category (for example, there is no way to search the list). There are plans to update the BLL in the near future.*

Bhargava not alone

Thank you for the FOCUS article on Manjul Bhargava. It's always exciting to read about such a talented mathematician. I did wonder about whether his two years to a full professorship at an Ivy was the shortest period — it may be a tie. Bill Thurston did his thesis in 1972 and was a full professor at Princeton in 1974. Princeton was right in picking Thurston, so we can be optimistic that Prof. Bhargava will have as fulfilling a career.

George Lang
Fairfield University

You are right about Thurston — it is a tie. And I'm sure you're right about Bhargava too!

Curious Cover Photo

I was wondering how the moon in its nearly full phase shows up in a sunset photo near Phoenix as shown on the cover photo of the October issue of FOCUS?

Paul Martin

Interesting, isn't it? The lit part of the moon isn't even in the direction of the sun!

You see, there's a distortion in the space-time continuum in the sky just above Phoenix caused by the future presence of a large number of mathematicians…

In Memoriam

David Rosen died in August at the age of 82. He was a professor at Swarthmore College and an MAA member for 48 years. In the 1970s he was a member of the Board of Governors, representing the EPADEL Section.

George B. Mackiw died in September. He was 58, and had taught mathematics at Loyola College in Baltimore for 33 years. Described as "a good friend of mathematics," he was an MAA member for 34 years.

Donald Western, Professor Emeritus of Mathematics at Franklin & Marshall College, died on Wednesday, September 17th. He had been an MAA member since 1944.

FOCUS will print short death notices of MAA members. Please send names, dates, and one or two biographical sentences to the editor at fqgouvea@colby.edu.

Childcare at the Joint Meetings

By Maeve McCarthy

Childcare is an issue that affects many mathematicians. When we make a decision to attend a conference, we do so with all aspects of our lives in mind. The Meetings Bureau rotates the week in January that is used for the Joint Meetings, so this decision has different factors every year. Does the conference conflict with the start of school — for us or our children? It is my belief that mathematicians should not be put in a position where they cannot attend a conference because of a childcare need that could be met by conference organizers.

Should AMS & MAA be doing something about this?

Absolutely! I was not particularly shocked when I discovered that the American Academy of Pediatrics (AAP, http://www.aap.org) offered a supervised childcare service and a lactation room at their annual meeting. One would expect such an organization to be supportive of parental needs. I was, however, quite surprised to find that the American Bar Association (ABA, http://www.abanet.org/) and the American Political Science Association (APSA, http://www.apsanet.org) provided a similar childcare service. Naturally, these services are not free. But I find it interesting that some professional societies offer this kind of service, but ours do not. In the absence of this kind of support for parents, our profession suffers. Mathematicians should pave the

way here and address this issue at the Joint Meetings.

What are parents currently doing in order to attend the Joint Meetings?

Some leave their children at home with a spouse, grandparent or sitter. Others hope that their non-mathematician spouse can take some vacation time to come to the Joint Meetings with them and their children. These options can put lots of pressure on a spouse. Some will arrange babysitters through the hotel or Chamber of Commerce. A few will even bring a babysitter to the Joint Meetings, which is definitely an expensive way to do it. Sometimes people form co-ops with other mathematicians to provide childcare. Last year, one such group asked the Meetings Bureau for a room that they could use to let their kids play while some parents went to talks and others stayed with the children. The Meetings Bureau said it would be unable to provide such a room because of liability issues.

Mathematics Couples

The need for childcare at the Joint Meetings (and other conferences) is felt by all, but particularly by women mathematicians who are more likely to be married to mathematicians than to non-mathematicians. Many mathematics couples use the "tag-team" approach at conferences with both attending, both taking care of their children, and neither fully participating in the conference. An alternative approach is for only one spouse of a mathematics couple to attend. Both of these approaches negatively impact the participation of a mathematician in his/her profession.

What should the Meetings Organizers do?

I have found two main schools of thought on what should be done. The first is to provide a drop-off childcare room serviced by professionals similar to a day care program. Companies exist that provide this service at conferences and this is the type of program used by other professional organizations like AAP, ABA and APSA. The second is to provide a child-centered room where parents can stay with their children and let them play or nap as needed. This type of approach would allow the co-ops that currently exist between groups of mathematicians to continue to swap babysitting responsibilities.

Each of these options has different merits. There are legal and financial aspects to be considered. The first option is preferred by those who will allow their children to be supervised by formal day care (provided caregivers are suitably qualified), while the second is preferred by those who wish to only leave their children with people they know personally. It may not be possible to keep all types of parents happy all of the time on this issue, but the Meetings Bureau should consider these options and seek other suggestions. The lack of adequate childcare at the Joint Meetings is becoming more of an issue as our society changes. It's time to address this! ■

Maeve L. McCarthy is Associate Professor of Mathematics at Murray State University and a member of the FOCUS editorial board.

Note from the Editor

My article on choosing a textbook for a number theory course (in the September issue) generated a large number of responses, including one from a former student who took that course. He noted that he took the course later in his undergraduate career, and that therefore he could have handled a more advanced and more formal text. (I have no doubt you could have, Justin!) He agreed, however, that the wide range of levels of prepara-

tion in the class would not have allowed such a text to be used. Most of the responses, however, were of the "do you have an article on textbooks for X?" variety. Somehow, these never turned out to be offers to *write* such an article! So let's reiterate the challenge: what's the best textbook? What would you choose for a topology course? For a course in complex variables? For abstract algebra? For a geometry course aimed at pre-ser-

vice teachers? Fire up your word processor and let us know.

A rather unusual feature of *this* issue is the inclusion of a birth announcement. No, we won't be doing that routinely, but Jennifer Quinn's talk at MathFest (with the help of Art Benjamin) was well attended and many of the attendees expressed interest in knowing the final outcome. So Zack got in. ■

EMPLOYMENT OPPORTUNITIES

ARIZONA

The University of Arizona
Department of Mathematics
Tucson AZ

The Department of Mathematics is seeking applications for tenure-track positions at either the Assistant, Associate or Full Professor level, which will begin in Fall 2004. By the time of appointment, candidates are expected to have a Ph.D. and excellent research record or potential, as well as a strong commitment to teaching. Rank and salary depend on the qualifications of the selected candidate(s).

The Department may also have postdoctoral or visiting positions for the 2004-2005 academic year (Ph.D. required).

Further information about the full range of the Department's research and educational activities may be found at http://www.math.arizona.edu..

Application review begins October 1, 2003 and continues as long as positions remain unfilled. Applications received before October 1, 2003 will receive the fullest consideration; applications received after January 2, 2004 are unlikely to be considered.

Please send a letter of interest (specifying position(s) applied for), an AMS Cover Sheet (which can be downloaded from http://www.ams.org/coversheet), a curriculum vitae with a list of publications, a statement of research interests, a statement of teaching experiences/philosophy and a minimum of three (3) letters of recommendation (enclose or arrange to be sent) to:

Committee
Department of Mathematics
University of Arizona
P.O. Box 210089
Tucson, Arizona 85721-0089

The University of Arizona is an EEO/AA Employer-M/W/D/V.

CALIFORNIA

California State Polytechnic University, Pomona
Department of Mathematics
Two tenure track positions: Assistant or Associate Professor Level **Mathematics Education:** Teach undergraduate and service courses in mathematics education, opportunity to teach mathematics courses, provide in-service programs for local schools, assist with development of Master's in mathematics teaching, advise students pursuing secondary teaching credential, collaborate with others involved in mathematics education. **Qualifications**: Doctorate in Mathematics Education with master's in Mathematics (or equivalent), or doctorate in Mathematics with strong background in mathematics education. Will consider ABD's with imminent degree completion. Should be knowledgeable about current trends in mathematics education and applications of technology in mathematics education. Strong preference to applicants able to supervise student teachers. **Applied Mathematics or Statistics:** Teach undergraduate and graduate courses in mathematics or statistics. Preference given to applicants having expertise in design of experiments, multivariate analysis, statistical consulting, time series analysis, control theory, differential equations, estimation theory, mathematical modeling, stochastic differential equations. **Qualifications:** Ph.D. in Mathematics or Statistics or in related area, completed by September 2004. Position dependent upon funding. **Both Positions:** Expected to engage in professional development and scholarly research, committee service, student advising, curriculum development. Benefits include start-up package, reduced teaching load for first year. Rank/salary commensurate with experience/qualifications. **Qualifications:** Evidence of, or potential for, teaching excellence, conducting scholarly activities, directing master's candidates, working with diverse student body. **Review begins 1/12/2004,** and continues until position is filled or closed. Submit application form indicating area of interest, curriculum vitae, teaching philosophy statement, research statement, undergraduate and graduate transcripts, minimum of three recent reference letters. Package must address background and interest in each of the qualifications, and will be available for examination by all department tenure track faculty. Send to: Faculty Search Committee, Mathematics Department, Cal Poly Pomona, 3801 W. Temple Ave., Pomona, CA 91768-4007; 909-869-4008; Fax: 909-869-4904; math@csupomona.edu. Visit http://www.csupomona.edu/~math/position. AA/EEO.

CONNECTICUT

Fairfield University
Assistant Professor Mathematics
The Department of Mathematics and Computer Science at Fairfield University invites applications for a tenure-track assistant professorship in mathematics to begin in September, 2004. A doctorate in mathematics is required. Strong evidence of research potential, demonstrated success in classroom instruction and a solid commitment to teaching are essential.

Fairfield University, the Jesuit University of Southern New England, is a comprehensive university with about 3000 undergraduates and a strong emphasis on liberal arts education. Fairfield's Department of Mathematics & Computer Science consists of 14 full-time faculty members. The teaching load is three courses/nine credits per semester. Fairfield offers a very competitive benefits package. The picturesque campus is located on Long Island Sound in southwestern Connecticut about 50 miles from New York City. Fairfield is an Affirmative Action/Equal Opportunity Employer. For further details see http://cs.fairfield.edu/mathhire.

Applicants should send a letter of application, a curriculum vitae, and three letters of recommendation, which comment on the applicant's experience and promise as a teacher and scholar to Chris Bernhardt, Chair of the Department of Mathematics and Computer Science, Fairfield University, Fairfield, CT 06824. Full consideration will be given to complete applications received by January 15, 2004.

Fairfield University is an Affirmative Action/Equal Opportunity Employer.

Visit our website at www.fairfield.edu.

GEORGIA

Columbus State University
The Mathematics Department at Columbus State University invites applications for a tenure track position beginning August 2004. Responsibilities: teach four courses per semester, academic advising, service for the department and university, and scholarship. Required: excellent written and verbal communication skills; PhD in the mathematical sciences or statistics by August 2004. Teaching experience and potential for continued research preferred. For information about the department, university, and application procedures, see http://math.colstate.edu. Application review begins December 1, 2003. An AA/EEO employer, CSU is committed to diversity and equality in education and employment.

ILLINOIS

Southern Illinois University
Southern Illinois University Edwardsville, a comprehensive state university 20 miles from downtown St. Louis, Missouri, invites applications for a tenure-track position in **Mathematics Education** at the rank of assistant professor beginning August 2004. Applicants should have a PhD in mathematics with experience in mathematics education. We will consider applicants who have a strong commitment to teaching and a demonstrated capacity to perform research. The successful candidate will teach precalculus, calculus and upper level courses in mathematics and will share responsibility for methods courses, advisement, and supervision of student teachers.

Send a letter of application, curriculum vitae, transcripts (unofficial transcripts are acceptable for now), and three letters of recommendation to:

Search Committee
Department of Mathematics
and Statistics
Campus Box 1653F

Southern Illinois University Edwardsville
Edwardsville, IL 62026-1653

Please use the AMS Standard Cover Sheet. Review of applications will begin on December 19, 2003 and continue until the position is filled.

SIUE is a state university—benefits under state-sponsored plans may not be available to holders of F1 or J1 visas.

MARYLAND

United States Naval Academy
The USNA Mathematics Department anticipates at least one tenure-track position (subject to approval and funding) at the Assistant Professor or Associate Professor level, depending on qualifications, to start in August 2004. See web site http://www.usna.edu/MathDept/website/Hire.htm for full information. Tel: 410-293-6701; Fax: 410-293-4883; Email: amg@usna.edu. The United States Naval Academy is an Affirmative Action/Equal Employment Opportunity Employer and provides reasonable accommodations to applicants with disabilities.

MICHIGAN

Grand Valley State University
Grand Valley State University, in Allendale, Michigan, is accepting applications for the position of Assistant or Associate Professor in Mathematics, with employment to begin in August 2004.

Required qualifications include a Ph.D. in Mathematics; demonstrated excellence in teaching undergraduate mathematics; a commitment to continued scholarly and professional growth; strong teaching recommendations; a willingness to have students use technological tools to promote understanding; and evidence of critical, reflective thinking about the teaching and learning of mathematics at the undergraduate level. All candidates must be interested in teaching courses throughout the curriculum, including precalculus mathematics.

For more information, including responsibilities of the position, and important details on how to apply, see our position description at http://www.gvsu.edu/

math/jobs.html. Review of applications will begin by December 5, 2003 and continue until the position is filled, or the search is closed.

NEW HAMPSHIRE

Dartmouth College
John Wesley Young
Research Instructorship
The John Wesley Young Instructorship is a post-doctoral two-year appointment intended for promising Ph.D. graduates with strong interests in both research and teaching and whose research interests overlap a department member's. Current research areas include algebra, analysis, combinatorics, geometry, logic and set theory, number theory, probability, and topology. Instructors teach four ten-week courses distributed over three terms, though one of these terms in residence may be free of teaching. The assignments normally include introductory, advanced undergraduate, and graduate courses. Instructors usually teach at least one course in their own specialty. Nine-month salary of $44,676.00 supplemented each year by summer research stipend of $9,928.00 for Instructors in residence for two months in summer. To be eligible for a 2004-2006 Instructorship, candidate must be able to complete all requirements for the Ph.D. degree before September, 2004. Applicants should get a copy of the application information and the required response-form at http://www.math.dartmouth.edu/recruiting/. Or, submit a letter of application, curriculum vitae, graduate school transcript, thesis abstract, statement of research plans and interests, and at least three, preferably four, letters of recommendation to Donna Black, Department of Mathematics, Dartmouth College, 6188 Bradley Hall, Hanover, New Hampshire 03755-3551. At least one referee should write about applicant's ability; at least two referees should write about applicant's research ability. Applications received by January 5, 2004 receive first consideration; applications will be accepted until position is filled. Dartmouth College is committed to diversity and strongly encourages applications from women and minorities.

Dartmouth College

The Department of Mathematics anticipates a tenure-track opening with initial appointment in the 2004-2005 academic year. The position is for an Assistant Professor in Applied Mathematics who has practical experience in statistical techniques and methods. Various applied projects in the department are currently funded by NSF, NIH, and DoD. Active collaborations with computer science, the medical and engineering schools, and programs in cognitive neuroscience exist. Collaborations and/or appointments in Dartmouth's M.D./Ph.D. program, as well as Dartmouth's Institute for Secure Technologies Studies, are also possible. Candidates with several years of experience should be able to give evidence of a research program that has achieved peer-recognition and which promises future research leadership in the mathematical community. Candidates who do not have this level of experience must have demonstrated the potential for future mathematical research leadership in their Ph.D. work. In exceptional circumstances, an appointment to a higher level may be possible.

Candidates for the position must be committed to outstanding teaching and interaction with students at all levels of undergraduate and graduate study, and must demonstrate an exceptional potential for research. Candidates should have demonstrated practical experience in statistical techniques and methods and be eager to take responsibility for the department's statistics offerings.

To create an atmosphere supportive of research, Dartmouth offers new faculty members grants for research-related expenses, a quarter of sabbatical leave for each three academic years in residence and flexible scheduling of teaching responsibilities. The teaching responsibility in mathematics is two courses per quarter for two ten-week quarters or one course for each of two quarters and two courses for one quarter. The combination of committed colleagues and bright, responsive students encourages excellence in teaching at all levels.

To apply, get a copy of the application information and the required response-form at http://www.math.dartmouth.edu/recruiting/. Or, send a letter of application, curriculum vitae, and a brief statement of research results and interests, and arrange for four letters of reference, at least one of which specifically addresses teaching, to be sent to Donna Black, Recruiting Secretary, Department of Mathematics, Dartmouth College, 6188 Bradley Hall, Hanover, New Hampshire 03755-3551. Applications received by January 5, 2004 will receive first consideration.

Dartmouth College is committed to diversity and strongly encourages applications from women and minorities. Inquiries about the progress of the selection process may be directed to Dan Rockmore, Recruiting Chair.

NEW YORK

Bronx Community College of the City University of New York

The Department of Mathematics & Computer Science invites applications for five tenure track positions for Spring/Fall 2004. A Ph.D. in mathematics or computer science is preferred; enrollment in a doctoral program is desirable in its absence. Candidates must have a record of and commitment to excellence in teaching and continued scholarly activity. The department has 26 full-time and 50 part-time faculty members. Courses offered range from developmental to upper level mathematics and computer science. Bronx Community College encourages applications from women and minority candidates and is an AA/EOE. Send a letter of application, a statement of teaching philosophy, resume, graduate transcript(s) and three recent letters of reference (at least one should address teaching) to: Shelley B. Levy, Director of Human Resources, South Hall, Room 106, Bronx Community College/CUNY, University Avenue & West 181 Street, Bronx, NY 10453. Closing date: Open until filled. Additional information available at: www.bcc.cuny.edu. EOE/AA.

OHIO

Oberlin College

Full-time, continuing position beginning the 2004-2005 academic year. Responsibilities include teaching undergraduate courses in mathematics (5/year), supervising honors students, and sustained scholarly production. A Ph.D. degree (in hand or expected by August 31, 2004) is required. Preference given to candidates interested in and with experience in applied mathematics, particularly classical applied mathematics or mathematical biology. Candidates must demonstrate potential excellence in teaching. Send letter of application, *curriculum vitae,* academic transcripts (graduate and undergraduate, unofficial acceptable initially), and 3 letters of reference to Michael Henle, Department of Mathematics, Oberlin College, Oberlin OH 44074 by November 17, 2003. Late applications may be accepted until filled. Oberlin College admitted women since its founding in 1833 and historically has been a leader in the education of blacks. AA/EOE.

University of Cincinnati

College of Applied Science
Department of Mathematics, Physics, and Computing Technology
Assistant Professor of Mathematics
The OMI College of Applied Science at the University of Cincinnati invites applications for a full-time tenure-track faculty position in mathematics to begin in September, 2004. The OMI College of Applied Science is a fully accredited baccalaureate college with an international reputation in delivering innovative education in science and technology. The Department of Mathematics, Physics, and Computing Technology presently has thirteen full time faculty and offers BS and AS degrees in Computer Science Technology, Information Engineering Technology, and Information Technology as well as support courses in mathematics, physics, and computing technology. This position is contingent on availability of funding.

This is a nine month appointment with possible optional opportunity to teach during alternate summers. The position requires a minimum of a master's degree in mathematics with a doctorate preferred. Demonstrated teaching excellence in mathematics at the college level is required. The candidate must be able to teach a full range of undergraduate mathematics offerings from algebra through differential equations and discrete mathematics and must be willing to teach classes in both day and evening

as part of the regular teaching load (which is typically 12 credits per quarter). Also, the candidate should be familiar with the use of modern technology in the classroom. Excellent oral and written communication skills are required as are interpersonal skills necessary to deal professionally, effectively and courteously with faculty, students, staff, administrators, and the public. The priority is teaching but other duties include advising and counseling of students, participating in scholarly activities, and serving on department, college and university committees.

Salary will be commensurate with expertise and experience. Excellent benefits are included. Review of applications will begin in October, 2003 and continue until the position is filled. Only candidates with complete folders (consisting of: a letter of application, resume, official copies of all undergraduate and graduate transcripts, and three letters of recommendation) will be considered. Send the aforementioned items to **Melinda Stout, OMI College of Applied Science, University of Cincinnati, 2220 Victory Parkway, Cincinnati, OH 45206** (email: melinda.stout@uc.edu).

To learn more about the OMI College of Applied Science, visit our home page at http://www.uc.edu/cas. The University of Cincinnati is an affirmative action/equal opportunity employer. Women, minorities, disable persons, Vietnam-era and disabled veterans are encouraged to apply. UC is a smoke-free environment.

University of Dayton
Applications are invited for a tenure track position in the Department of Mathematics at the assistant professor level starting in August 2004. Candidates must have a Ph.D. in mathematics, financial mathematics, statistics, or some related field. Preference will be given to applicants with experience in stochastic or computational methods in financial mathematics. Applicants must have a strong commitment to research, and the potential to become an effective teacher. Responsibilities include teaching, mentoring, and curriculum development in support of a newly developed MS program in Financial Mathematics. Further responsibilities include teaching in a

strong undergraduate major in mathematics, research, and service.

The selection process begins December 15, 2003. To receive full consideration, all materials must be received by January 14, 2004. A complete application consists of a resume, three letters of recommendation, a statement of research and professional plans, and a statement of teaching philosophy. Both teaching abilities and research abilities should be addressed in the letters of recommendation. Please include an e-mail address in your correspondence.

Send applications to: Dr. Joe Mashburn, Chair of the Mathematics Search Committee, Department of Mathematics, University of Dayton, Dayton, OH 45469-2316. Contact the search committee at joe.mashburn@udayton.edu. To obtain further information, see http://www.udayton.edu/~mathdept.

The University of Dayton is a private comprehensive Catholic university founded by the Society of Mary in 1850. It has more than 6000 undergraduate and 3000 graduate students. The Department of Mathematics offers the B.A. and B.S. degrees in mathematics, the B.S degree in applied mathematical economics, and the M.S. degree in applied mathematics. The University of Dayton is an Equal Opportunity/Affirmative Action employer. Women, minorities, individuals with disabilities, and veterans are encouraged to apply. The University of Dayton is firmly committed to the principle of diversity.

PENNSYLVANIA

Shippensburg University
Mathematics: Department seeks Doctorate in Mathematics or Mathematics Education, having a primary interest in mathematics teacher preparation for a tenure track Assistant Professor position beginning August 2004. Candidates who are ABD upon hire may be considered. A terminal degree from an accredited institution is required for tenure. Primary responsibilities include: Teach undergraduate math education and math courses, supervise student teachers and demonstrate professional commitment to regional mathematics teachers. Pref-

erence given to candidates with two years of K-12 teaching experience or the equivalent in knowledge and experience. A demonstration of teaching effectiveness will be required as part of the interview. All candidates must furnish proof of eligibility to work in the U.S. upon appointment. Shippensburg University is an Equal Opportunity Employer. See http://www.ship.edu/~math/ for more details. Review of applications begins November 15, 2003, and will continue until the position is filled. Qualified candidates should send a letter of interest, curriculum vitae, official undergraduate and graduate transcripts, and three letters of reference to: Search Committee, Attention Fred Nordai, Department of Mathematics, 1871 Old Main Drive, Shippensburg, PA 17257. Phone (717) 477-1431.

OREGON

University of Oregon
Department of Mathematics Applications are invited for tenure-track Assistant or Associate Professor positions in all areas of pure and applied mathematics, statistics and mathematics education. Qualifications are a Ph.D. in the mathematical sciences, an excellent record of research accomplishment, and evidence of teaching ability. See http://darkwing.uoregon.edu/~math/employment.html

Competitive salary with excellent fringe benefits. Mail complete vita and at least three letters of recommendation to Search Committee, 1222 Department of Mathematics, University of Oregon, Eugene, OR 97403-1222. Application materials may NOT be submitted electronically.

Closing date is January 5, 2004. Women and minorities are encouraged to apply. The University of Oregon is an EO/AA/ADA Institution committed to diversity.

SOUTH DAKOTA

South Dakota School of Mines and Technology
Assistant or Associate Professor of Mathematics
The Mathematics and Computer Science Department at South Dakota School of

Mines and Technology (SDSM&T) invites applicants for a tenure track position in Mathematics. Possibility of second position, depending upon funding. The successful applicant will have a Ph.D. in Mathematics or closely related field and a strong commitment to excellence in teaching. Preference given for background in applied mathematics. Will be expected to teach a wide range of undergraduate mathematics courses, advise students, guide them in projects, participate in scholarly activity, and serve on departmental and college committees. Typical teaching load is three courses per semester. While teaching is the most important part of this position, some research will be expected. Anticipated start date August 2004.

Applicants should submit a letter of application, resume (with curriculum vitae), transcripts, and three letters of recommendation to (NO ELECTRONIC/E-MAIL APPLICATIONS WILL BE ACCEPTED): South Dakota School of Mines and Technology, Department of Mathematics and Computer Science, Mathematics Search Committee, 501 East St. Joseph Street, Rapid City, South Dakota 57701-3995.

Preference will be given to individuals with an established record of excellence in teaching and research. Review of applications will begin December 1, 2003 and will continue until the position is filled. For more information regarding Rapid City and the department visit www.rapidcity.com and www.mcs.sdsmt.edu.

SDSM&T is an EEO/AA/ADA employer & provider.

VIRGINIA

Shenandoah University
Mathematics Faculty: The Mathematics Department at Shenandoah University invites applications for a full-time, career contract track, assistant professor position in mathematics beginning in August 2004. A Ph.D. in mathematics is preferred. The successful candidate would be expected to teach introductory level mathematics courses as well as higher level courses such as Numerical Analysis and Biostatistics. Teaching is recognized as the most important faculty activity at Shenandoah University, and we seek faculty members who focus on individual student learning styles and motivations. The interaction of scholars in various disciplines and teaching fields is encouraged as the university develops interdisciplinary programs in health profession education. Academic service, such as mentoring students, and scholarship are also expected. Shenandoah encourages faculty/student collaborative research.

Joint spousal applications are welcomed. Complete applications will include a statement of interest, including a statement of teaching philosophy, curriculum vitae, official transcripts, and three letters of recommendation. Send applications to: Dr. Elaine F. Magee, c/o Office of the Dean of Arts and Sciences, Shenandoah University, 1460 University Dr., Winchester, VA 22601-5195. Review of applications begins November 15 and continues until the position is filled. EOE. No phone calls, please.